



DEVELOPMENTAL STAGES OF *XYLOCORIS SORDIDUS* (HEMIPTERA: ANTHOCORIDAE)^{1,2}

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ABSTRACT: The developmental stages of *Xylocoris sordidus* (Reuter), a predaceous bug that occurs in storage ecosystems, are described. The egg was studied by scanning electron microscopy, and details of its chorionic sculpturing are characterized.

Xylocoris sordidus (Reuter) is one of several anthocorid bugs that occur as predators in storage ecosystems (Arbogast, 1979). It was described in 1871 from two specimens: a female from Brazil which Carayon (1972) designated the lectotype and a male from Texas. *Xylocoris sordidus* is apparently distributed over the Western Hemisphere from at least as far south as Chile to as far north as Massachusetts (Arbogast et al., 1983).

Carayon (1972) gave a brief account of its identification and figured the "ectospermalege" of the female type and the hemelytron. He stated that the former structure provides a reliable character for distinguishing *X. sordidus* from other members of the subgenus *Proxylocoris*. The biology of *X. sordidus* was unknown until Arbogast et al. (1983) published an account of its demography. The present paper completes the account of its biology by providing descriptions of its developmental stages.

MATERIALS AND METHODS

The insects examined were from cultures that have been maintained at the Stored-Product Insects Research and Development Laboratory, Savannah, Georgia, since 1979. The source of these cultures, rearing methods, and deposition of voucher specimens were described by Arbogast et al. (1983). Most observations were made on living insects. Measurements of nymphs and adults were taken at X 25 from living insects lightly anesthetized with carbon dioxide. Length was measured from tip of tylus to tip of abdomen; the width of the head was measured across the eyes. Egg measurements were taken at X 150 from the screen of a scanning electron microscope

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(SEM) or from scanning electron micrographs. All measurements are given in millimeters as means \pm standard deviation with the number of measurements (n) given in parentheses. For examination of structural detail nymphs and adults were cleared in potassium hydroxide and mounted on microscope slides. For examination in the SEM, eggs were mounted on SEM stubs with double-sided tape and sputter coated with gold. They were examined in an ISI, M-7(R) SEM at 15 kV.

DESCRIPTIONS

Egg (Figs. 1-2). Length 0.77 ± 0.02 mm, diameter at broadest point 0.31 ± 0.02 mm (n = 15), ellipsoid, curved near anterior end, with a prominent collar surrounding the operculum (Fig. 1A). Chorion marked by a reticulate pattern of polygonal cells, bold near anterior end, but becoming weaker posteriorly. Cell discs marked by numerous minute perforations ca. $0.3 \mu\text{m}$ in diameter (Fig. 2A). Shallow grooves radiating from each perforation give the total structure a stellar appearance (Fig. 2B). Operculum circular and concave with convex central disc (Fig. 1B).

Central disc marked by a reticulate pattern of polygonal cells, surrounded by an outer ring of nearly rectangular cells sloping upward to collar. Discs of opercular cells with an irregular porous texture (Fig. 2C). Aeropylar openings distributed around inner circumference of outer ring (Figs. 1B, 2D). Micropyles absent as in other Lyctocorinae (Hinton, 1981). Eggs inserted up to the collar in a moist medium.

Newly deposited eggs are translucent milky. As development proceeds, they become pale ochreous with a faint reddish cast, and the orange-red eyes and abdominal scent glands of the nymph become visible through the chorion. The collar and outer ring of the operculum are opaque white.

Nymph. (Figs. 3A, 3B) - Nymphs shining and sparsely setose. Head triangular, about as broad across the eyes as long. Rostrum three-segmented. Antennae four-segmented with the two distal segments slender and clothed with long erect setae. Thoracic nota transverse. Tarsi two-segmented with segment I much shorter than segment II. Abdominal terga III, VIII, and IX each bearing two long setae, one on each side; those of segment III located near middle; others situated near lateral margins. Abdominal scent glands appear as two median spots on abdominal terga IV and V. Four pairs of dorsal abdominal scent gland openings: a pair between segments III and IV, IV and V, and V and VI, with the openings of each pair joined by a groove, and a separated pair between segments VI and VII with openings slightly mesad of the others.

First Instar. (Fig. 3A). - Length 0.98 ± 0.07 mm, width of head 0.22 ± 0.00 mm (n = 13). Head, thorax, and abdomen pale ochreous suffused with orange-red. Eyes and abdominal scent glands orange-red. Legs, antennae, and rostrum nearly colorless. Head, thorax, and first three antennal segments tinged with black. Wing pads absent. A long seta (absent in subsequent instars) near each lateral margin of fourth abdominal tergum.

Second Instar. Length 1.38 ± 0.05 mm, width of head 0.26 ± 0.01 mm (n = 13). Essentially same color as first instar but with a heavier orange-red suffusion and occasionally with some black tinting of abdomen. Wing pads barely visible.

Third Instar. - Length 1.71 ± 0.09 mm, width of head 0.31 ± 0.01 mm (n = 18). Head, thorax, and abdomen ochreous, heavily suffused with orange red, especially head and thorax. Eyes dark orange-red. Abdominal scent glands orange-red to fuscous. Legs, antenna, and

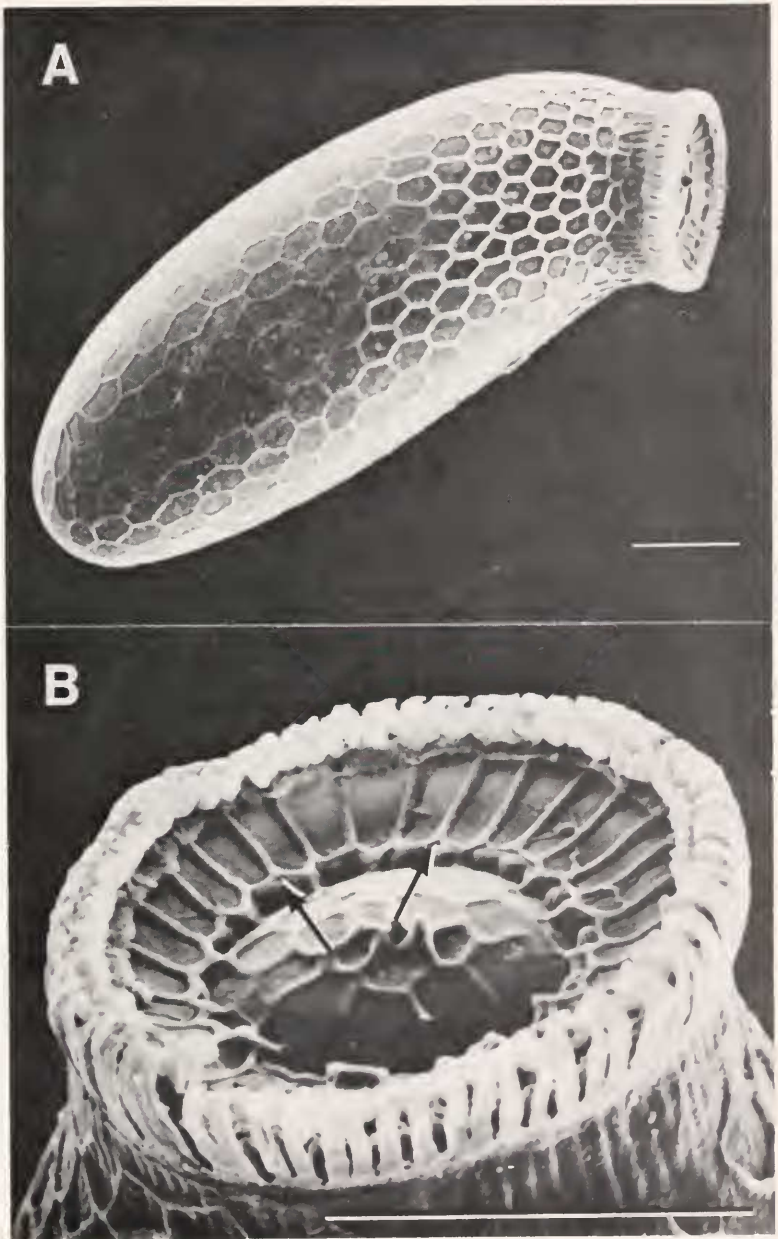


Fig. 1. Egg of *Xylocoris sordidus*. Scale lines = 0.10 mm. A. Lateral view. B. Anterior end showing details of collar and operculum (arrows indicate aeropylar openings).

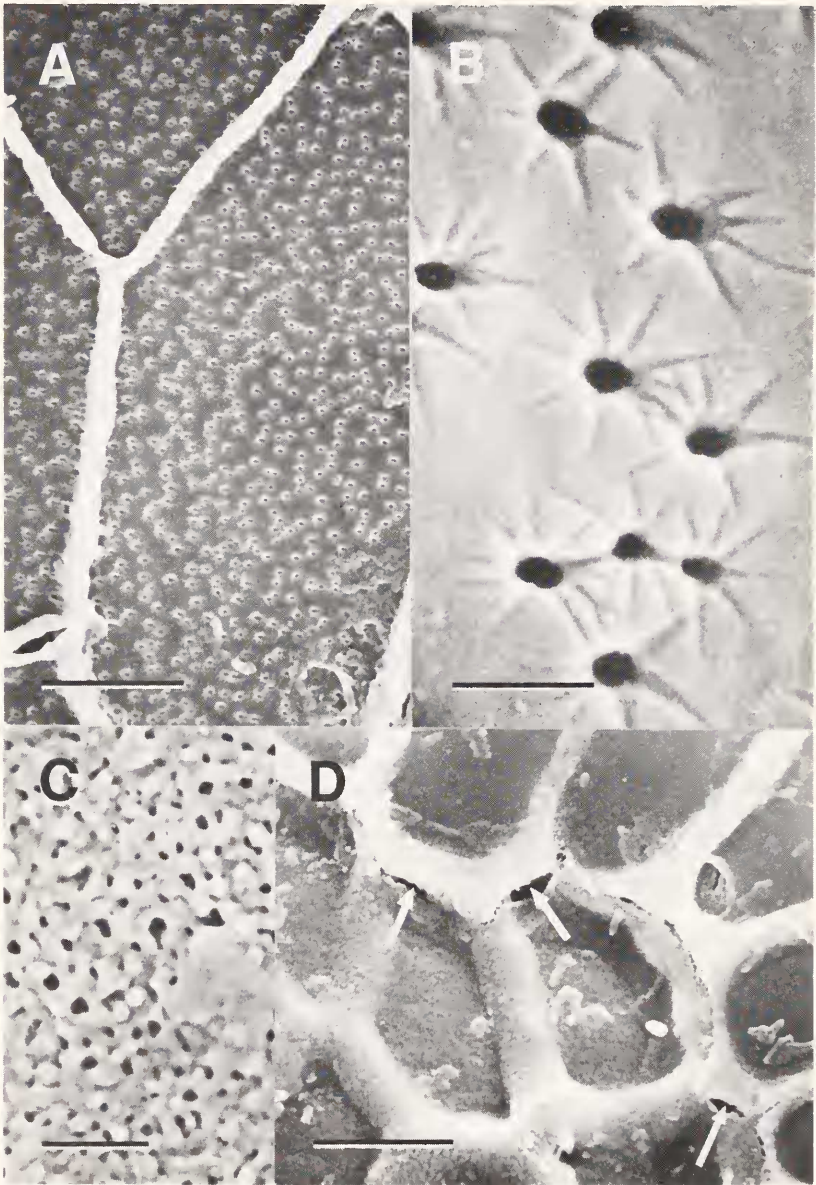


Fig. 2. Egg of *Xylocoris sordidus*, structural details. Scale lines = 1 μm (B,C) or 10 μm (A,D). A. Section of chorion near equator showing cell disc with microperforations. B. Same area at higher magnification, showing the stellar appearance of the microperforations and associated grooves. C. Section of chorion on the operculum showing the texture of an opercular cell disc. D. Section of operculum showing aeropylar openings (arrows) on the inner circumference of the outer ring.

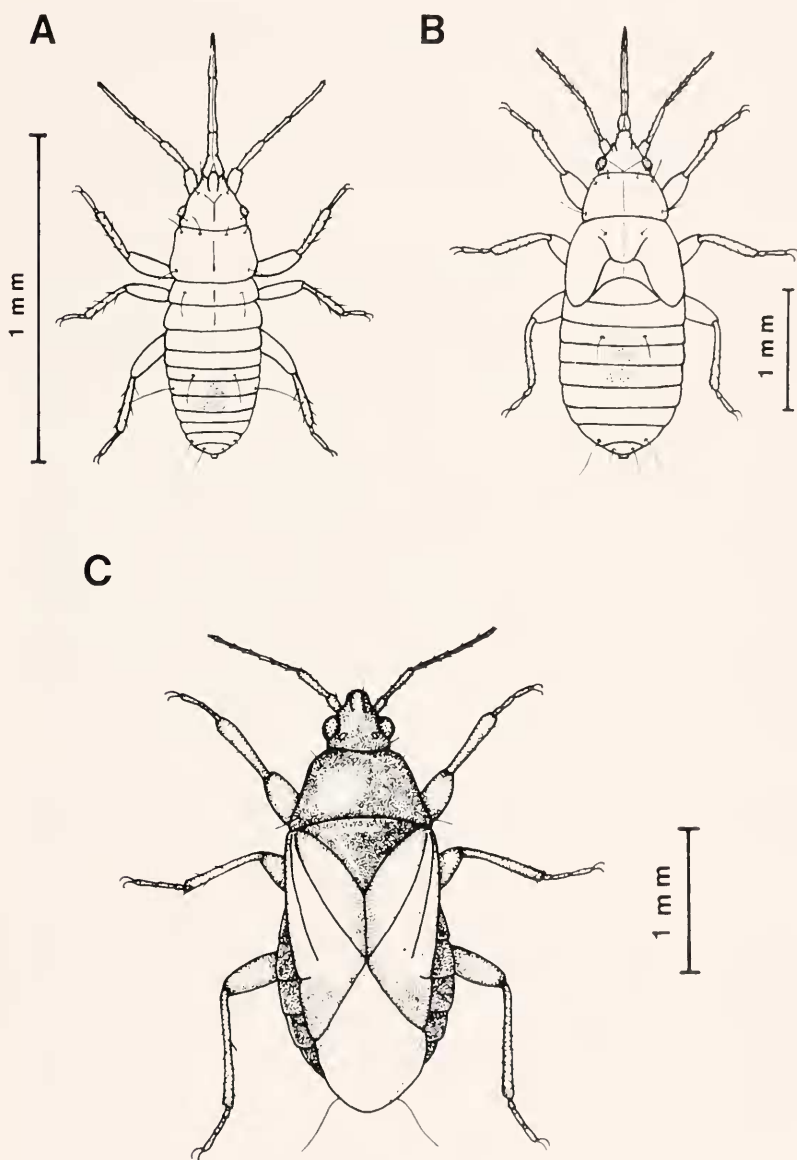


Fig. 3. *Xylocoris sordidus*. A. First instar. B. Fifth instar. C. Adult female.

rostrum pale ochreous, nearly colorless. First three antennal segments and femora tinged with black. Anterior portion of head (frons, tylus, juga) and thorax, (except for mid-dorsal area) infusate. Lateral portions of abdominal segments IV - IX sometimes infusate. Meso- and metathoracic wing pads evident; tips of mesothoracic wing pads not extending beyond mid-posterior margin of metanotum.

Fourth Instar. Length 2.13 ± 0.14 mm, width of head 0.38 ± 0.01 mm ($n = 15$). Similar in color to third instar but usually with more extensive infuscation of abdomen, occasionally extending completely across some abdominal segments. Tips of mesothoracic wing pads extending well beyond mid-posterior margin of mesonotum but not reaching tips of metathoracic pads.

Fifth Instar. (Fig. 3B). - Length 2.65 ± 0.17 mm, width of head 0.44 ± 0.01 mm ($n = 17$). Head, thorax, and abdomen ochreous, suffused with orange-red. Anterior portion of head (frons, tylus, juga), pronotum (except, occasionally for median portion), wing pads, and all or part of abdomen infusate. Infuscation of abdomen usually lighter or absent on first two segments, giving the appearance of a light band across the body at this point. Infuscation often limited to lateral portions of last two segments, giving the appearance of a light patch in this area. Eyes deep brick red. Abdominal scent glands fuscous. Legs, antennae, and rostrum ochreous. Wing pads extending to abdominal segment II, tips of mesothoracic pads reaching tips of metathoracic pads.

Adult (Fig. 3C). - Male: length 2.83 ± 0.13 mm, width of head 0.45 ± 0.01 mm ($n = 8$). Female: length 2.98 ± 0.10 mm, width of head 0.48 ± 0.01 mm ($n = 8$). Males and females similar in appearance. Head, thorax, and abdomen shining, piceous with sparse pale pubescence of short appressed setae, a few erect setae of medium length on head and pronotum and a pair of long setae on ninth abdominal tergite. Eyes dark brown, ocelli red. Rostrum brown, extending slightly beyond anterior coxae. Antennae brown and ochreous; segments III - IV slender, clothed with long erect setae; segments I - II more robust, clothed with setae of medium length. Pronotum slightly convex, sides immarginate, anterior angles rounded. Scutellum raised anteriorly. Both sexes macropterous; wings covering all abdominal segments when not distended by recent feeding. Hemelytra pale ochreous, sparsely pubescent; membrane long and clear hyaline. Cuneus and distal margins of corium and clavus infusate. Coxae and femora brown, tibiae and tarsi ochreous; tibiae armed with stout setae.

ACKNOWLEDGMENT

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